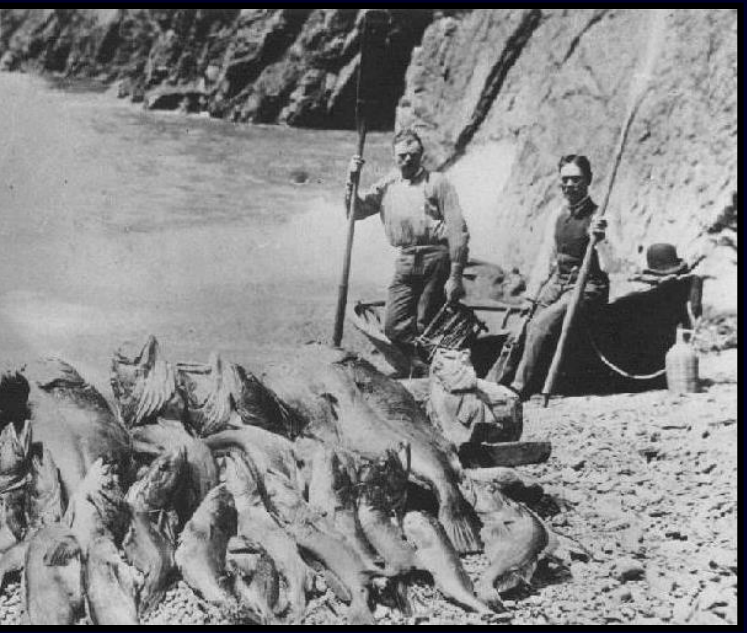
# Reconstructing historical trends in rockfish abundance from local ecological knowledge in Puget Sound



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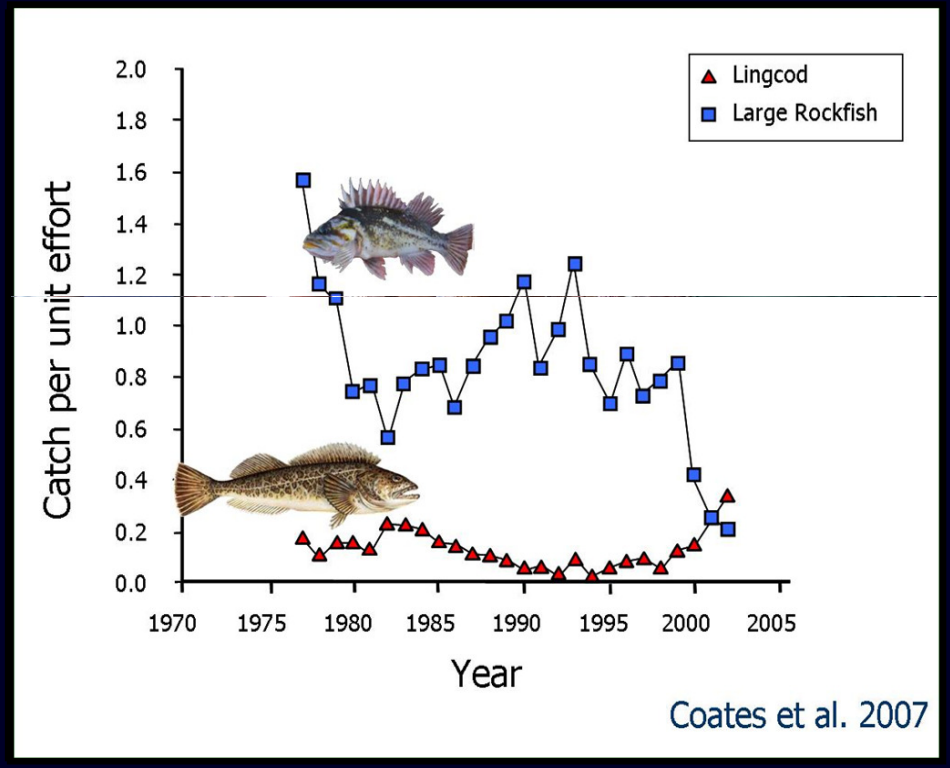
# Historical changes in Puget Sound fish communities

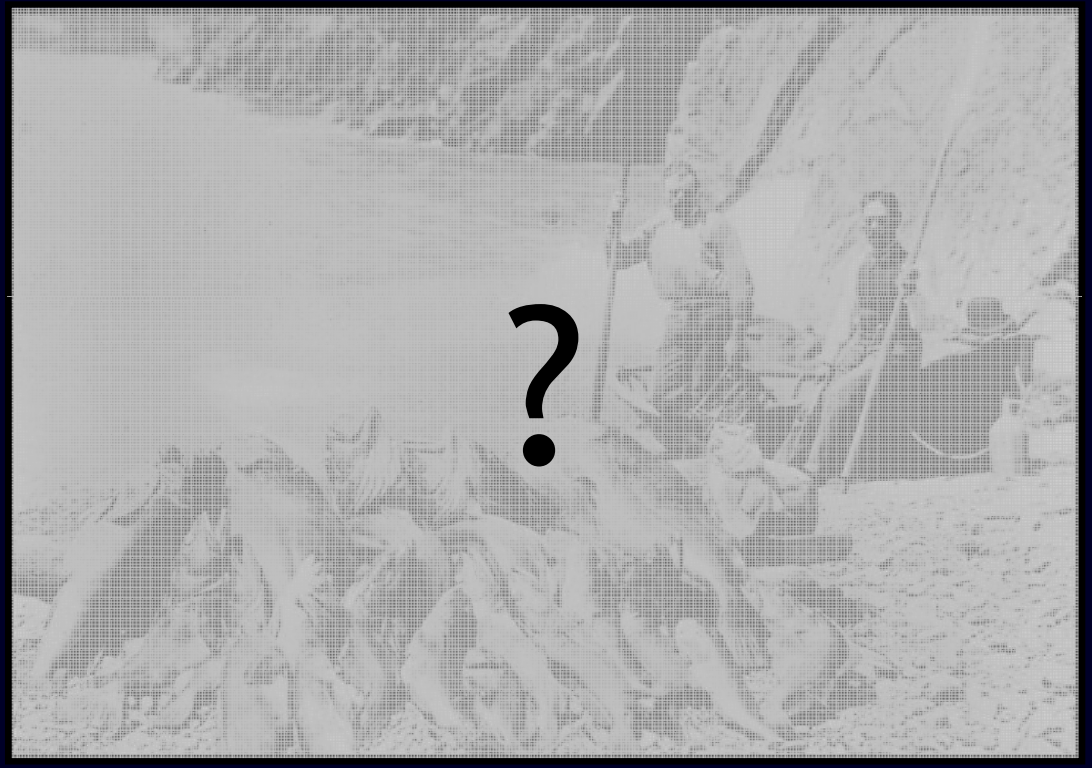
Source: www.pacificsites.com

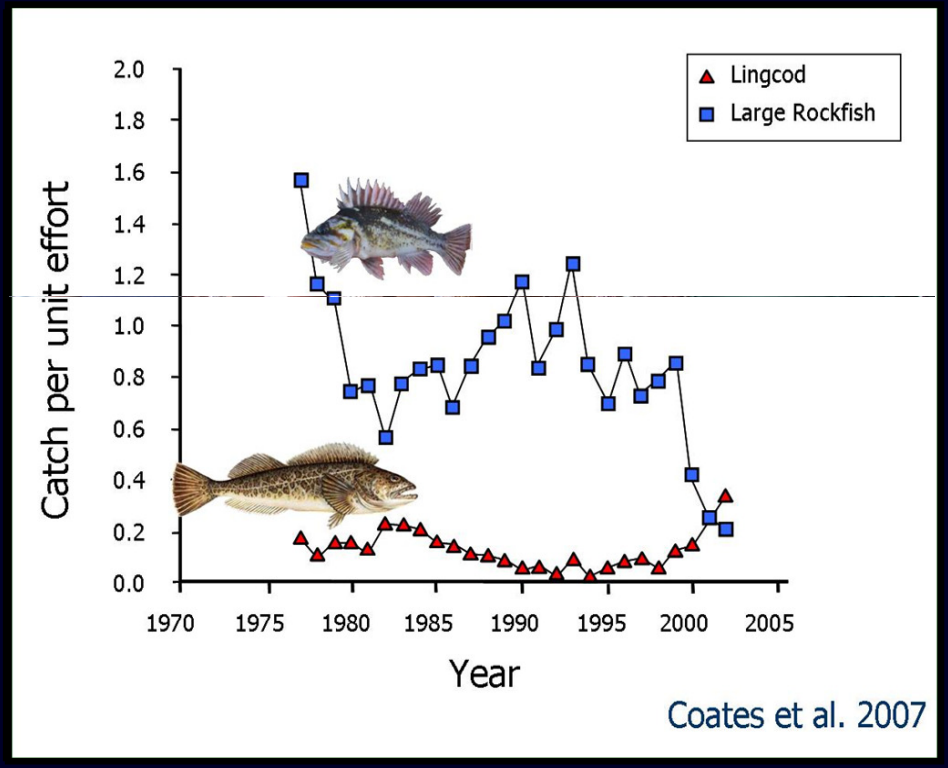
A. Beaudreau

# Historical changes in Puget Sound fish communities



# Historical changes in Puget Sound fish communities




Recovering rockfishes requires that we know what healthy populations looked like historically. Unfortunately, for many species there is little or no historical data about their population abundance.

# Shifting baselines

## 1950s

*avg*
*6.5 oz*


*king size*
*12 oz*


## 2000s

*avg*
*16 oz*


*large*
*32 oz*

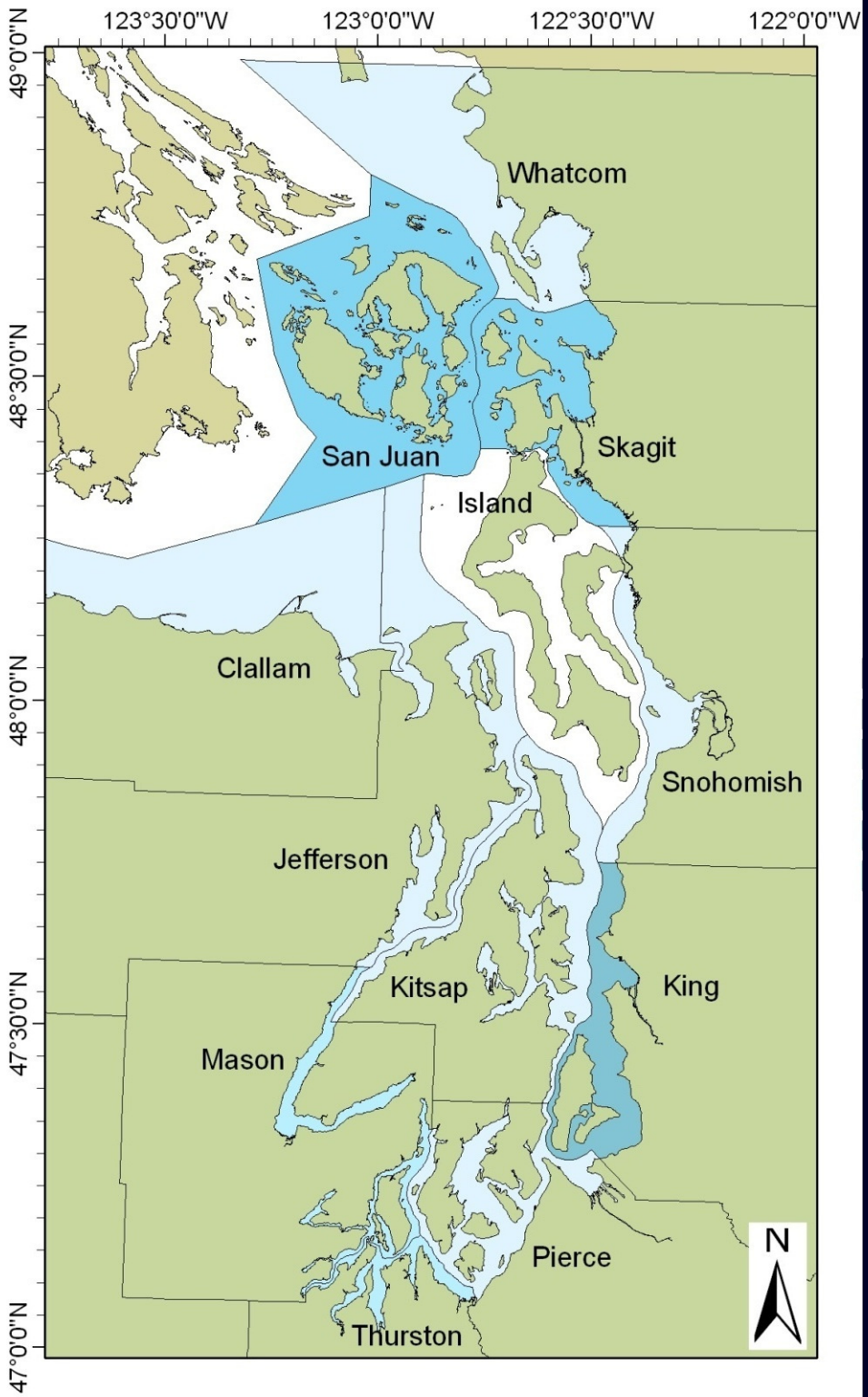
# Shifting ecological baselines?

# Creating a historical baseline of species abundance

Objectives

1) Reconstruct abundance trends of Puget Sound species since ca. 1940 using expert knowledge

2) Evaluate whether the "shifting baseline syndrome" is evident for rockfishes



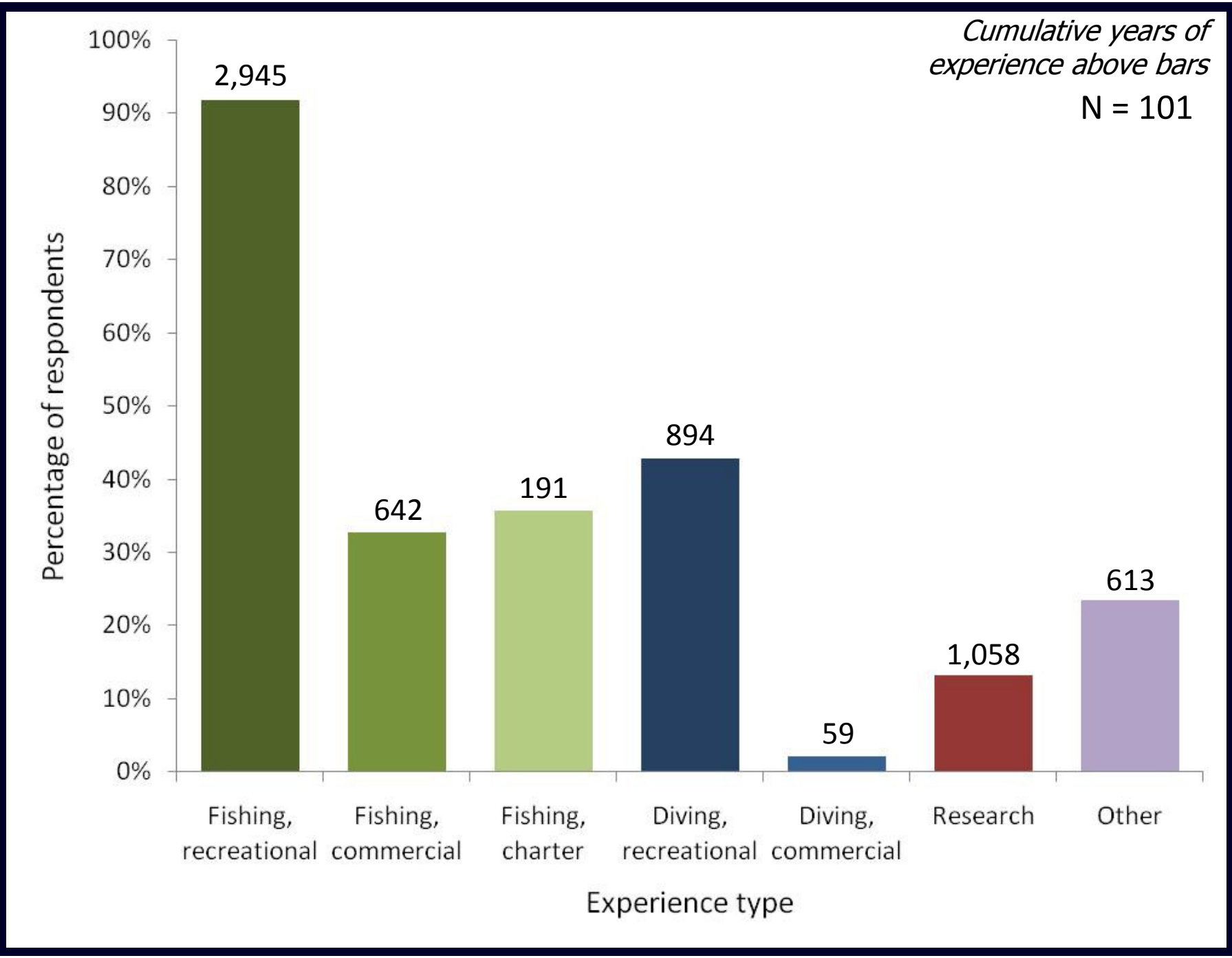

# Approach: Interviews

- 101 interviews (2009-2010)
- 24 – 90 years old; median = 60
- Olympia to Bellingham

Number of respondents

- 0
- 1-5
- 6-10
- 11-15
- 16-20
- > 20

# Expertise of respondents



# Approach: Interviews

- In-person interviews (avg. 2 hrs)
  - Fishing / diving / research practices
  - Location & geographic extent of fishing / diving over time
  - Observations of relative species abundance & body size
- 23 species, incl. 7 rockfishes:
  - Black rockfish (*Sebastes melanops*)
  - Brown rockfish (*S. auriculatus*)
  - Copper rockfish (*S. caurinus*)
  - Quillback rockfish (*S. maliger*)
  - Canary rockfish (*S. pinniger*)
  - Yelloweye rockfish (*S. ruberrimus*)
  - Bocaccio (*S. paucispinis*)

# Approach: Interviews

*Indicate abundance level for each decade*

| 1940s | 1950s | 1960s | 1970s | 1980s | 1990s | 2000s |
|---|---|---|---|---|---|---|
| High | High | High | High | High | High | High |
| Medium | Medium | Medium | Medium | Medium | Medium | Medium |
| Low | Low | Low | Low | Low | Low | Low |

# Rockfish trends: all species

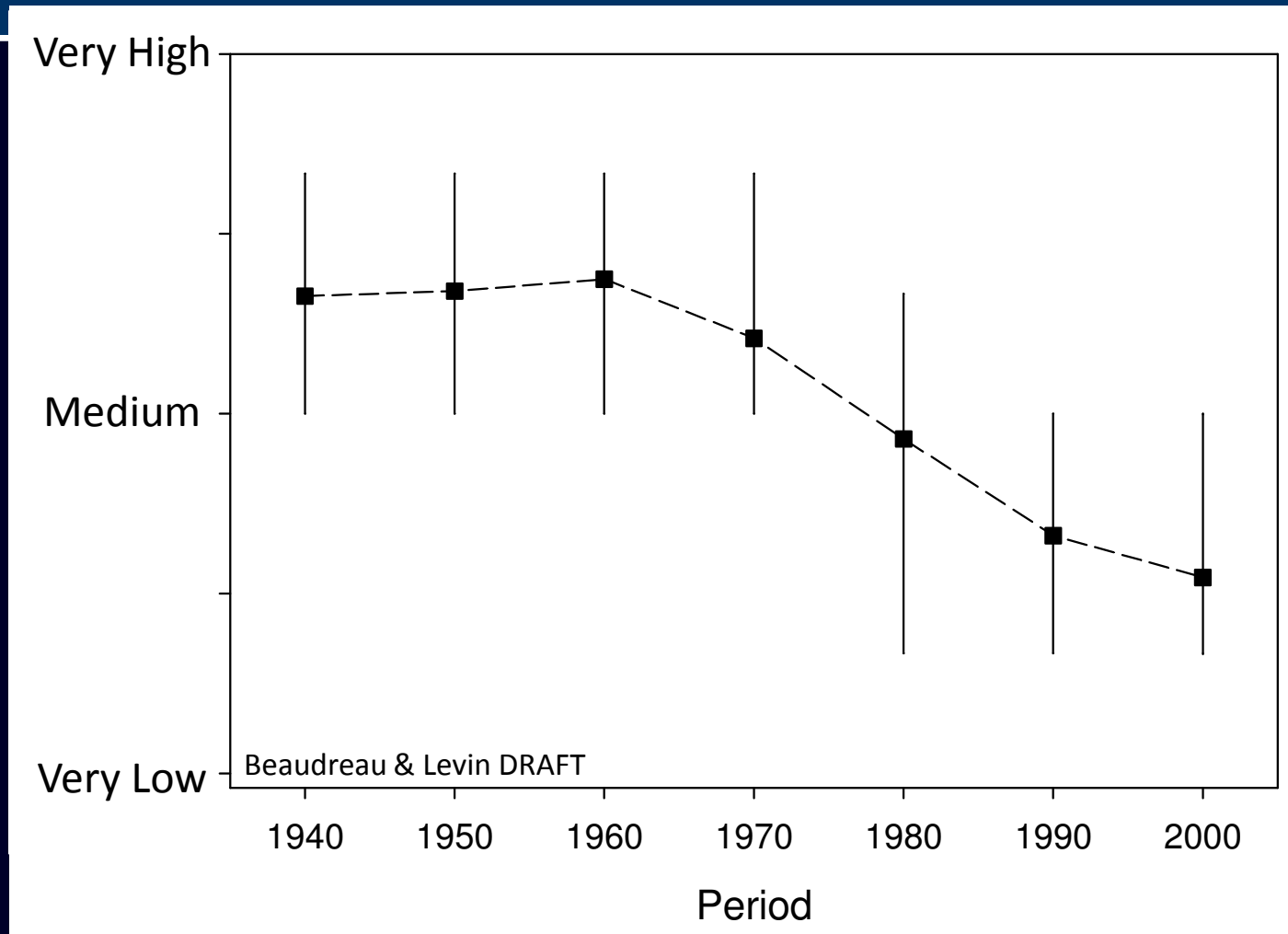



**Figure 1** Mean decadal abundance index reported by respondents (N = 101) for seven rockfishes (*Sebastes* spp.). Whiskers show first and third quartiles of observed values. An index of 1.0 corresponds to a score of 'very high' abundance, 0.5 is 'medium' abundance, and 0 is 'very low' abundance.

# Rockfish trends: brown rockfish & bocaccio

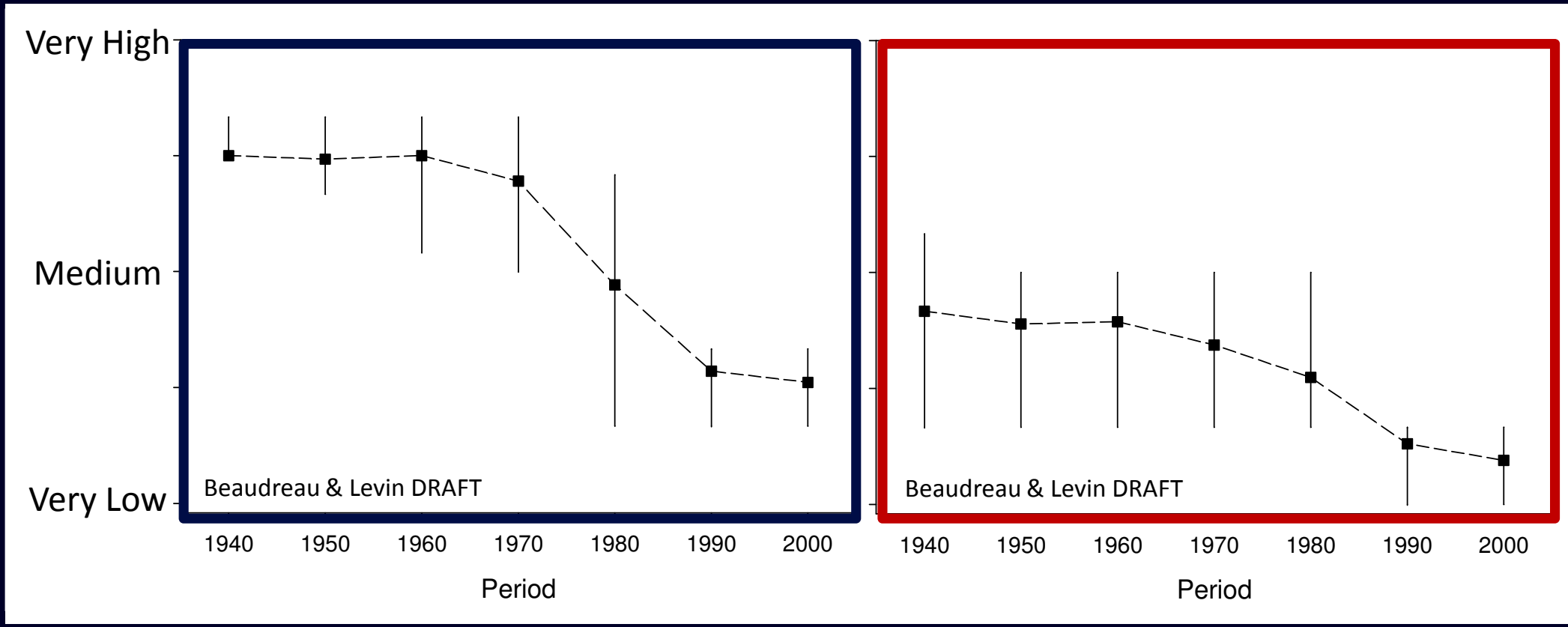



**Figure 2** Mean decadal abundance index reported by respondents (N = 101) for **brown rockfish (*Sebastes auriculatus*)** and **bocaccio (*S. paucispinis*)**. Whiskers show first and third quartiles of observed values. An index of 1.0 corresponds to a score of 'very high' abundance, 0.5 is 'medium' abundance, and 0 is 'very low' abundance.

# Evidence for shifting baselines

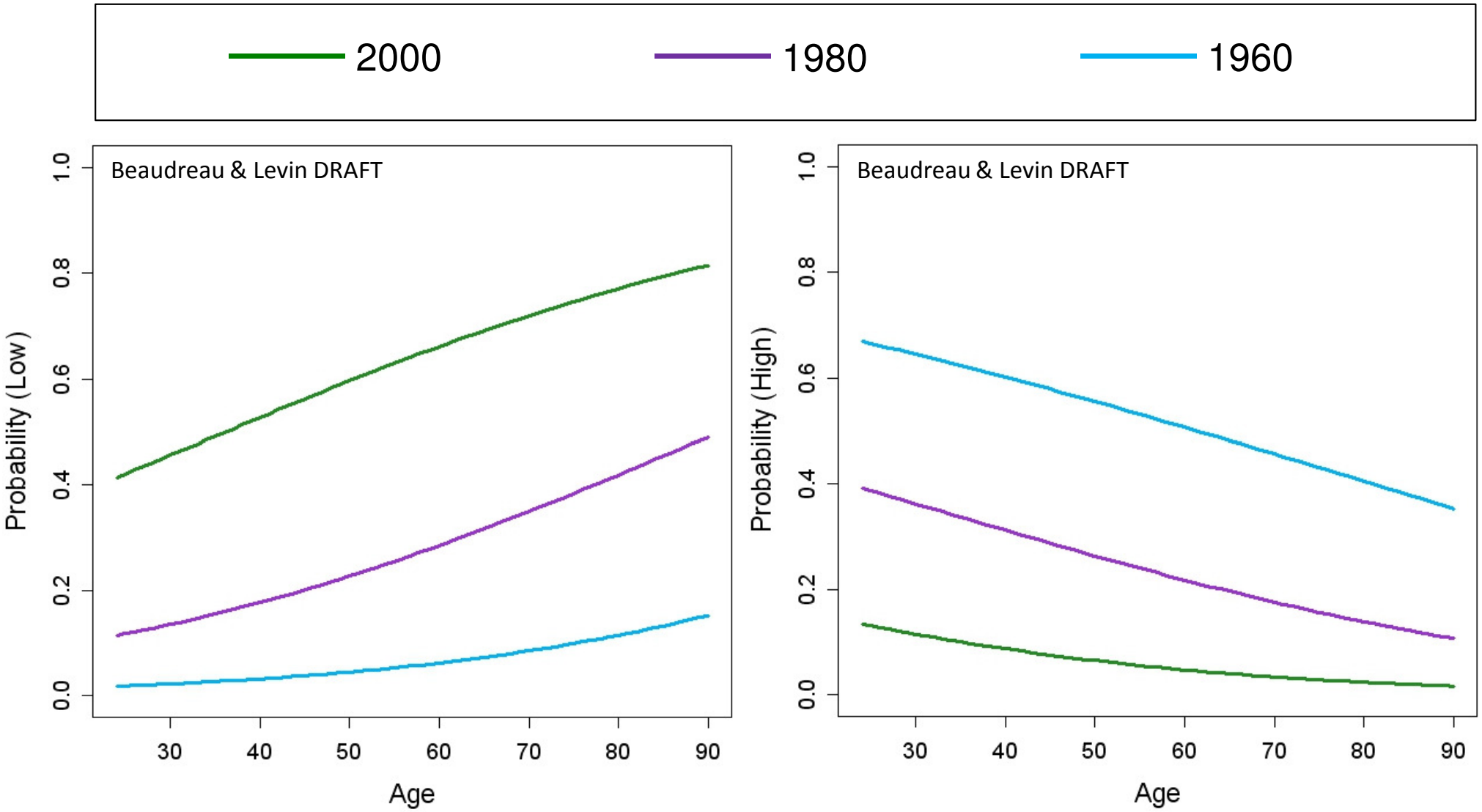



**Figure 3** Predicted probability of reporting (a) low and (b) high abundance as a function of respondent age from a multinomial logistic regression for three periods: 1960 (solid gray line), 1980 (dashed black line), and 2000 (solid black line). Younger people have a rosier outlook on the condition of rockfish.

# Summary of results

1) Interview respondents perceived declines in seven species of rockfish since at least the 1960s

2) Bocaccio, yelloweye, and canary were seen as relatively less abundant than other rockfishes

3) The magnitude and rate of perceived declines increased with respondent age

# Interpreting local ecological knowledge

1) Do abundance trends mirror scientific understanding?

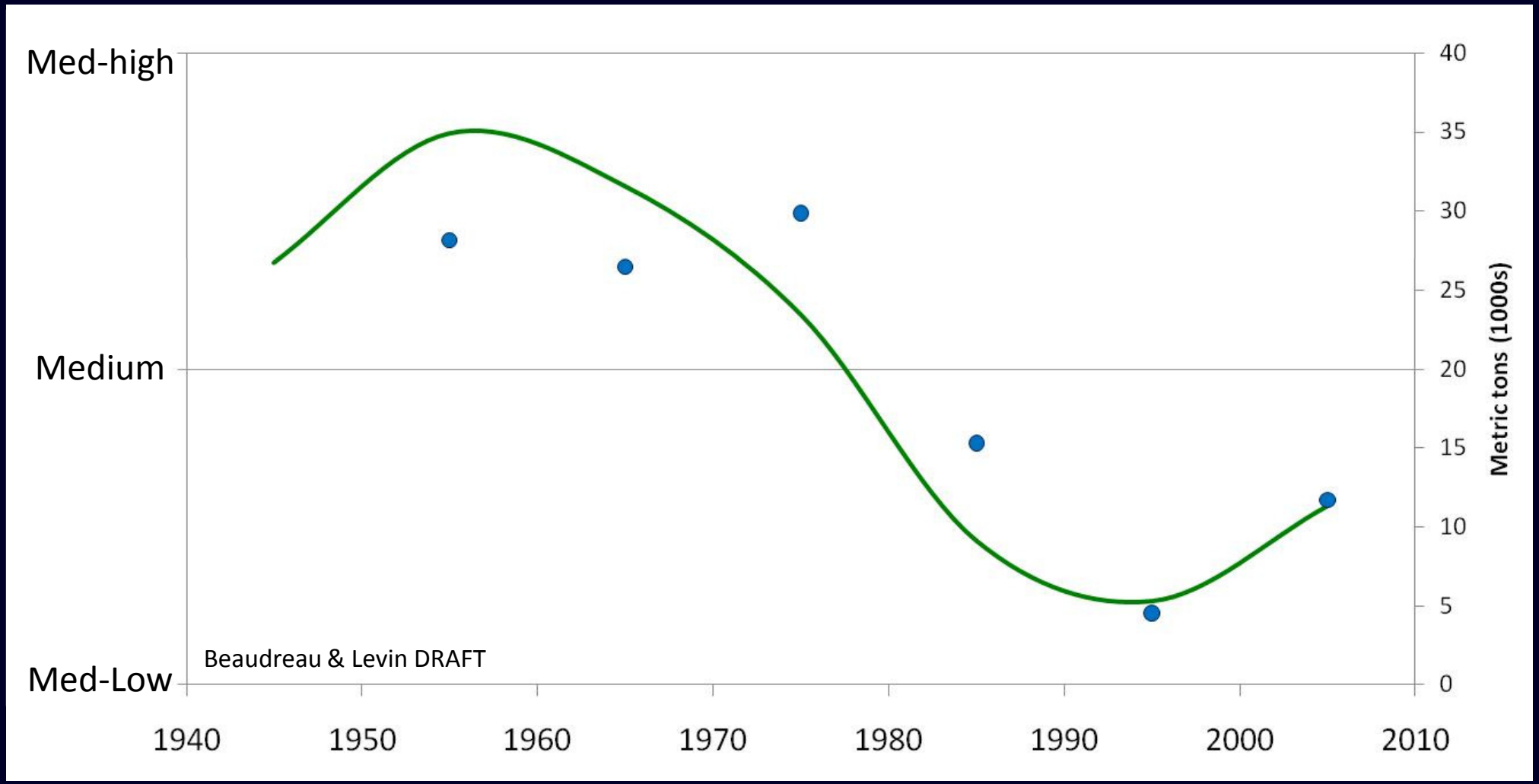
2) Is variation in perception of trends related to

    a) resource use practices?
    b) geography or other demographic factors?
    c) species identification and grouping?

# Lingcod

Biomass estimate from coastwide assessment

Relative abundance index from interview data



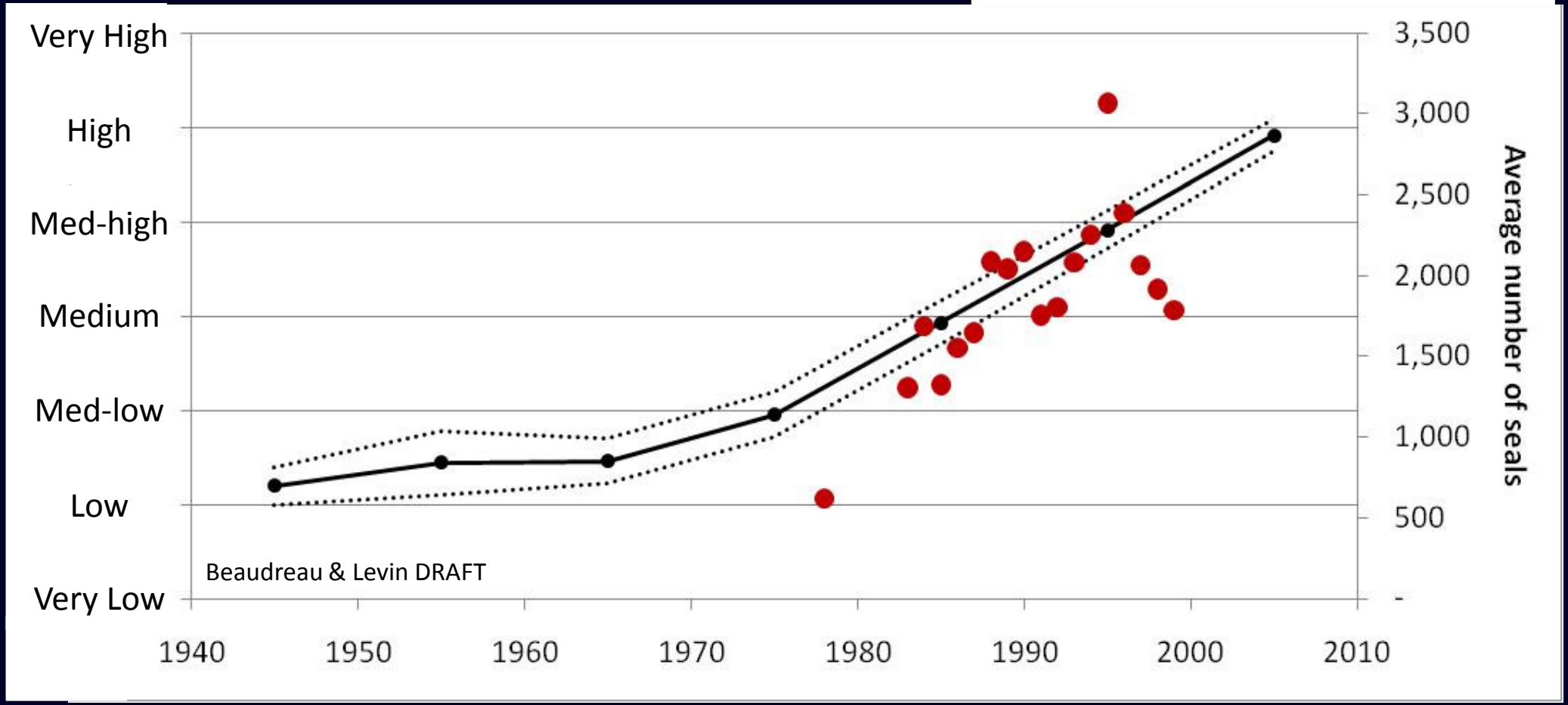

Data source: Hamel et al. 2009

# Harbor seals

● Avg. number of seals from haul-out counts

— Relative abundance index from interview data (+/- 1 SE)

• Protected since 1972




Data source: Jeffries et al. 2003

# Interpreting local ecological knowledge

Do perceptions of how species are grouped and identified influence interpretation of abundance changes?

*Courtesy of Big Salmon Resort, Neah Bay, WA*

Beaudreau AH, Levin PS, Norman KC (In review) Using folk taxonomies to understand stakeholder perceptions for species conservation.

# Acknowledgements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